

[illegible]

**(10) International Publication Number**  
**WO 2003/092149 A3**

- (51) **International Patent Classification<sup>7</sup>:** **H02N 2/00,**  
H01L 41/04

(21) **International Application Number:**  
PCT/IB2003/001442

(22) **International Filing Date:** 17 April 2003 (17.04.2003)

(25) **Filing Language:** English

(26) **Publication Language:** English

(30) **Priority Data:**  
102 18 565.4 26 April 2002 (26.04.2002) DE

(71) **Applicant (for DE only):** **PHILIPS INTELLECTUAL PROPERTY & STANDARDS GMBH** [DE/DE]; Stein-  
damm 94, 20099 Hamburg (DE).

(71) **Applicant (for all designated States except DE, US):**  
**KONINKLIJKE PHILIPS ELECTRONICS N.V.** [NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven  
(NL).

(72) **Inventors; and**

(75) **Inventors/Applicants (for US only):** **WENDT, Matthias**  
[DE/DE]; c/o Philips Intellectual Property & Standards  
GmbH, Weissshausstr. 2, 52066 Aachen (DE). **STEIN-  
BUSCH, Hans** [DE/DE]; c/o Philips Intellectual Property  
& Standards GmbH, Weissshausstr. 2, 52066 Aachen (DE).  
**DIEFENBACH, Gerhard** [DE/DE]; c/o Philips Intellect-  
tual Property & Standards GmbH, Weissshausstr. 2, 52066  
Aachen (DE). **REICHINGER, Christian** [DE/DE]; c/o  
Philips Intellectual Property & Standards GmbH, Weis-  
shausstr. 2, 52066 Aachen (DE).

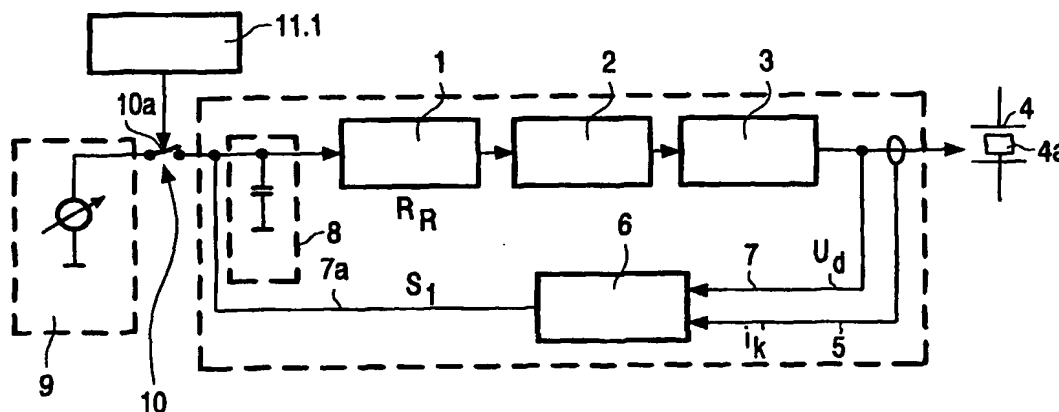
(74) **Agent:** **MEYER, Michael**; Philips Intellectual Property &  
Standards GmbH, Weissshausstr. 2, 52066 Aachen (DE).

(81) **Designated States (national):** AE, AG, AL, AM, AT, AU,  
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU,  
CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,  
GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,  
LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW,  
MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD,  
SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US,  
UZ, VC, VN, YU, ZA, ZM, ZW.

(84) **Designated States (regional):** ARIPO patent (GH, GM,  
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),  
Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),  
European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,  
ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO,  
SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM,  
GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

*[Continued on next page]*

- (54) Title:** STARTING-PROCESS CONTROLLER FOR STARTING A PIEZOMOTOR



- (S7) Abstract:** The invention relates to a starting-process controller for starting a piezomotor (4), having a voltage-controlled oscillator (1)(VCO), a power output stage (2), and a resonant converter (3), wherein the oscillator (VCO) generates the control signals required for the power output stage (2), and the resonance converter (3) converts the stepped output voltage from the power output stage (2) into a sinusoidal voltage at the output of the resonance converter (3), with which voltage the resonance converter (3) drives the piezomotor (4). The motor current that flows when the piezomotor (4) is driven is measured and compared with the phase of the drive voltage in a phase comparator (6). The output signal from the phase comparator (6) then is a measure for the phase difference at the time between current and voltage. A phase-locked loop filter (8) smoothes the phase-difference signal, which in turn controls the oscillator (1)(VCO). This starting-process controller (11) comprises a start-assisting circuit element (10) that fixes the output voltage from the phase-locked loop filter (8) at start-up and thus applies a constant voltage to the input of the voltage-controlled oscillator (1)(VCO).



**Published:**

— *with international search report*

**(88) Date of publication of the international search report:**

26 February 2004

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

## INTERNATIONAL SEARCH REPORT

PCT/IB 03/01442

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 H02N2/00 H01L41/04

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H01L H02N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, INSPEC, COMPENDEX

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	US 5 159 223 A (SUGANUMA RYOICHI) 27 October 1992 (1992-10-27)  column 4, line 26 -column 6, line 63; figure 1 column 8, line 46 - line 55; figure 5 --- -/--	1-7  10

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

20 November 2003

Date of mailing of the international search report

03/12/2003

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Köpf, C

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PCT/IB 03/01442

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	PATENT ABSTRACTS OF JAPAN vol. 013, no. 518 (E-848), 20 November 1989 (1989-11-20) & JP 01 209967 A (MATSUSHITA ELECTRIC IND CO LTD), 23 August 1989 (1989-08-23)	1-7
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A	--- US 5 508 579 A (SUGANUMA RYOICHI) 16 April 1996 (1996-04-16) column 5, line 9 -column 7, line 44; figures 2,3	1,5-7,10
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PCT/IB 03/01442

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